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TECHNOLOGY EDUCATION ACT OF 1986

AUGUST 11, 1986.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Mr. HAWKINS, from the Committee on Education and Labor, submitted the following

REPORT

[To accompany H.R. 3102]

[Including cost estimate of the Congressional Budget Office]

The Committee on Education and Labor to whom was referred the bill (H.R. 3102) to strengthen the technological literacy of the Nation through demonstration programs of technology education, having considered the same, report favorably thereon with an amendment and recommend that the bill as amended do pass.

The amendment strikes out all after the enacting clause of the bill and inserts a new text which appears in italic type in the reported bill.

SUMMARY

H.R. 3102, the Technology Education Act of 1986, recognizes that our future prosperity depends on our students' ability to compete in an increasingly technological world. To meet these challenges, the bill would help develop a "technologically literate" population through instructional programs in technology education at the secondary level.

This would be accomplished in a manner that requires no new Federal appropriations. From the existing Secretary's discretionary fund authorized by Chapter 2 of the Education Consolidation and Improvement Act, $2 million would be reserved for fiscal years 1987, 1988, and 1989 for these programs.

With these funds, the Secretary of Education would make grants to local educational agencies, State educational agencies, institutions of higher education and consortia of public and private agencies, organizations, and institutions to establish demonstration programs in technology education for secondary schools. Agencies, or-

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ganizations, and institutions desiring grants would have to submit applications describing the proposed program, estimating its cost, ensuring adequate evaluation and reporting, and assuring that the funds will not supplant State and local funds.

The purpose of these programs would be to develop a population that is familiar with technology and knowledgeable about its development, its effects, its uses, and its applications. The bill seeks to ensure that the model programs will be comprehensive, of high quality, and of maximum, impact by allowing funds to be used for the implementation of instructional programs as described in the bill, and for the following activities: teacher training, laboratory instruction, research and development of curriculum materials, and disseminating exemplary materials and practices.

These Federal funds would catalyze State, local, and private support through a requirement that 35% of the costs be provided from non-Federal sources, and that 10% of the total come from the private sector.

The Secretary would have to disseminate the results of these programs nationally, so that successful demonstrations could be adopted across the country.

Legislative Consideration

H.R. 3102 was introduced on July 30, 1985, by Congressman Boucher and was jointly referred to the Subcommittee on Elementary, Secondary, and Vocational Education, the Subcommittee on Postsecondary Education, and the Subcommittee on Select Education. The Subcommittee on Elementary, Secondary, Vocational Education conducted a hearing on the bill on February 19, 1986, at which individuals representing elementary and secondary education, higher education, and the business community testified.

On July 31, 1986, the full Committee on Education and Labor met and discharged the three Subcommittees from further consideration of H.R. 3102. At that meeting, the Committee ordered the bill reported, with amendments, by voice vote.

Need for the Legislation

Need for Technological Literacy

We are running the risk of jeopardizing this country's economic security by raising a technologically illiterate generation.

In less than eighty years, the American economy has changed from an agrarian one to one based on information, technology, and service industries. The United States led the world into a technological revolution, but in recent years we have not kept pace. Our dominance in heavy industry is slipping away. We are battling unprecedented competition in the development and production of computers, machine tools, construction equipment, automobiles, electronics, textiles, and appliances. Our mounting and persistent trade deficits are evidence of this struggle.

America will have to build its future in an increasingly technological world, where many talented nations are gearing up to compete effectively. New developments in medicine, biotechnology, electronics, and information processing will offer new complexities

and challenges. To meet these challenges, we will need useful inventions, fruitful research, efficient production, quality workmanship, and personalized service. National eminence in scientific and technological circles will require superbly educated mathematicians, scientists, engineers, and technological personnel. This has been vividly brought to our attention recently with the tragedy of the space shuttle Challenger.

To compete in this environment, the general population will need a relatively sophisticated understanding of technology, its applications, its dynamics, its opportunities, and its impact on markets, government, and people. This will entail more than just an understanding of how to use a computer or how to operate common equipment. Rather, it will entail a general familiarity with a variety of technological processes and applications.

Unfortunately, as technology has become more complex, the ability of the average citizen to understand it has declined. Without a concerted effort to improve the teaching of technology, the gap between current technological capabilities and students' understanding of technology will only increase.

EXTENT AND CONSEQUENCES OF TECHNOLOGICAL ILLITERACY

Data from a number of sources have documented declining student achievement in mathematics and science. These deficiencies in mathematical and scientific knowledge are relevant to technology, but do not tell the whole story. Our population also lacks a rudimentary understanding of technology and its applications.

For example, a recent National Science Foundation poll reported that only 19% of the people surveyed understood how a telephone works, only 24% knew how computer software operates, and only 31% could accurately explain radiation. Of 10 questions measuring technical literacy, respondents knew the answers to an average of 4.4, with 16% scoring 2 or lower. According to study author Jon D. Miller of the Public Opinion Laboratory of Northern Illinois University, these findings may mean that not enough of us can apply technology to solve concrete problems.

Our students' performance is particularly alarming when compared with the performance of students from Japan, Germany, Korea, and other competitor nations. These students consistently outscore American students in tests of mathematics, science, and technical ability. A key factor in these test results is most certainly the technological training provided by these nations as part of their educational systems, training provided by highly qualified faculty and supported at national expense.

This technological illiteracy affects our nation in many ways. First, American businesses and industries lose when they are unable to obtain employees with the skills demanded by a highly complex technical environment. Mr. Forest Brummett, Past President of the Society of Manufacturing Engineers and an engineer at the Detroit Diesel Allison Division of GMC, testified, "We are in desperate need of personnel trained with sharp analytical skills and the ability to think through complex technical situations. These individuals are not currently available from the educational institutions." As a consequence, Mr. Brummett noted, industry

must spend a great deal of money to train people—at ten times the cost of adequate training programs in the schools and with a less than desirable end result.

Second, our national defense suffers when citizens lack the technical know-how to operate sophisticated military equipment and understand complex defense systems.

Third, our society pays when a growing number of citizens are economically and politically disenfranchised because they cannot function well in an increasingly technological world.

NEED FOR AN EDUCATIONAL SOLUTION

Many of the major national commissions which examined the quality of American education in the early 1980's recognized this lack of knowledge about technology and recommended a much greater emphasis on the study of technology in the school curriculum. High School, the report on secondary education by the Carnegie Foundation for the Advancement of Teaching, summarized the need this way:

> We recommend that all students study technology: the history of man's use of tools, how science and technology have joined, and the ethical and social issues technology has raised. We are frankly disappointed that none of the schools we visited required a study of technology.

Similarly, the National Science Foundation report, Educating Americans for the 21st Century, concluded: "Technological literacy needs to be part of general literacy . . . In a sense we are speaking of 'basics' in education, and we are identifying the knowledge and understanding of technology as basic."

A technology education curriculum which provides technological literacy to all students is a relatively new concept, and as such has not been tried in all States. Virginia, New York, Texas, Wisconsin and other States which have pioneered technology education have found that these programs produce several benefits. Technology education can help students appreciate the importance of technology, apply and understand tools and materials, apply creative abilities, become wiser consumers, and make informed career choices. Secondary school students who participate in technology education courses are prepared for a number of possible career paths. They have an excellent background for additional college training in such programs as engineering, science, and architecture. If they wish to pursue vocational training at a postsecondary technical institution, they are well prepared for that option. Alternately, some students take technology education as general preparation to live in a technological world.

Investing in these programs is cost effective. Students with a firm grasp of technological concepts are our future inventors, researchers, scientists, and entrepreneurs. They hold the key to solving our energy, transportation, agriculture, and manufacturing problems, and to advancing the limits of knowledge.

The need for technological literacy is not a state or local issue. It is an issue of Federal importance and national economic survival, and that is why the Committee is proposing a Federal demonstra-

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tion program. While Korea, Japan, and other countries have placed a national priority on acquainting their students with the latest technological breakthroughs, our young people are being taught yesterday's technology. As Dr. Thomas Hughes, President of the International Technology Education Association testified, "Can the United States, which is falling behind as the leader in a technological world, afford not to fund an Act which could provide our children of today with the intellectual and technological skills which they need to compete in the 21st century?"

Federal involvement is needed to stimulate the development of promising approaches and to spread information about successful ones. A Federal program as envisioned in H.R. 3102 will complement existing Federal efforts in mathematics and science education, in teacher training, and in vocational education. The model programs supported through this bill will cut across subject area boundaries and offer ways of incorporating the study of technology into the entire educational program at the secondary level. H.R. 3102 will produce a national base of information upon which States and localities can build.

Provisions of the Bill

PURPOSE

H.R. 3102, The Technology Education Act of 1986, authorizes a new Federal program to assist educational agencies and institutions in developing a technologically literate population through instructional programs in technology education. For purposes of this bill, "technology education" is defined as a comprehensive educational process designed to develop a population that is knowledgeable about technology and its evolution, systems, techniques, utilization in industry and other fields, and social and cultural significance.

The Committee has decided that within the current Federal budget context, a national demonstration program is the best way to focus attention on and address the need for technology education. Consequently, the bill provides that the Federal government will support the development of a limited number of model programs, not more than ten. Through this approach, the Federal government will accomplish several goals with a modest amount of funding. First, it will assist in identifying effective strategies to teach students about technology. Second, it will stimulate State, local and private funding through matching provisions. Third, it will build State and local capacity to expand technology education programs through teacher training, research, and curriculum development. Finally, it will expand the impact of these programs beyond the States and localities funded by nationally disseminating the results of these projects.

AUTHORIZATION

Recognizing the current budget constraints, the Committee adopted an amendment to fund this program from existing resources instead of authorizing a new appropriation. Specifically, the amended bill reserves $2 million for each of the fiscal years

1987, 1988, and 1989 from the Secretary's discretionary fund authorized by Chapter 2 of ECIA. This fund—which amounts to 6 percent of the Chapter 2 block grant appropriations—supports national discretionary projects designated by Congress or by the Secretary. Currently, the ECIA statute earmarks a portion of the discretionary fund to be used for congressional priorities such as arts in education, alcohol, and drug abuse education, law-related education, and the inexpensive book distribution program. The technology education program would be in keeping with the types of national needs addressed by this fund. The remaining amount that is left after the congressionally-mandated projects are funded is used by the Secretary of Education for the Secretary's priorities.

ELIGIBLE APPLICANTS

Local educational agencies, State educational agencies, institutions of higher education, and consortia of public and private agencies, organizations, and institutions are eligible to apply to the Secretary for grants under the technology education program. The Secretary will make these grants on the basis of the information provided in an application and with consideration for equitable geographic distribution.

In order to ensure that these model programs are incorporated into secondary school curricula to the maximum extent possible, the Committee urges the Secretary, in making grants to the aforementioned consortia, to give priority to consortia which include a State educational agency or a local educational agency.

APPLICATIONS

Applications, or amendments to applications, shall be submitted at such time, in such form, and contain such information as the Secretary shall prescribe. In addition, the bill lays out several assurances and components that must be included in the application. Specifically, the application must:

(1) describe the program to be funded;

(2) estimate the cost to establish and operate the program;

(3) assure that the funded activities will be adequately evaluated;

(4) assure that Federal funds will be used to supplement and not to supplant State and local funds;

(5) provide for submission of such reports as the Secretary may reasonably require; and

(6) describe how these programs will be coordinated with programs under the Job Training Partnership Act, the Carl D. Perkins Vocational Education Act, and other relevant legislation.

USES OF FUNDS

Because there will be such a limited number of grants under this program, the Committee bill seeks to guarantee that the projects which are funded are comprehensive, are of high quality, and offer reasonable promise of success. Thus, H.R. 3102 contains several provisions describing in some detail the authorized uses of these

Federal funds. These include provisions describing the types of instructional programs that can be offered and provisions authorizing other, related activities such as teacher training. The Committee urges the grantees under this program to incorporate as many of the activities in section 4(c) as are applicable into their projects.

In describing the authorized instructional programs, section 4(c) of the bill allows funds to be used for projects that include an educational course content based on two factors: (1) an organized set of concepts, processes and systems that is uniquely technological and, (2) fundamental knowledge about the development of technology and its effect on people, the environment, and culture. Programs may also contain instructional content drawn from introductory technology education courses in one or more of the following areas: communications, construction, manufacturing, and transportation. The courses may address ways to develop students' skills, creative abilities, problem solving and decision-making abilities, confidence, and individual potential in utilizing technology. The bill also allows funds to be used for programs to assist students in developing insight, understanding, and application of technological concepts, processes, and systems.

In addition, the bill authorizes instructional programs to prepare students for life-long learning in a technological society and that combine an emphasis on "know how" and "ability to do" in carrying out technology work. Funds may also be used for laboratory instruction to reinforce abstract concepts with concrete experiences and for educating students in the safe and efficient utilization of tools, materials, machines, processes, and technology concepts.

The technology education programs may also address needs related to providing quality instruction. First, they may address teacher training needs, through multi-disciplinary teacher workshops on coordinating math, science, and technology education, or through institutions to develop teacher capabilities in technology education. The programs may also support research and development of curriculum materials for use in technology education and may include the employment of a curriculum specialist to provide technical assistance for the program. The bill also specifies that funds can be used for a state-wide plan for disseminating exemplary materials and practices in technology education.

MATCHING REQUIREMENTS

The Committee believes that these programs will only be successful if they have the support of States or localities and the private sector. Private sector input will ensure that technology education programs are coordinated with the actual technology demands of industry. To encourage this support, the bill requires that 35% of the costs of the program come from non-Federal sources, and that this non-Federal share include a 10% match from the private sector. The non-Federal contributions may be in cash or in-kind.

NATIONAL DISSEMINATION

In addition to the provision in the bill for a State-wide dissemination plan, the bill requires the Secretary to disseminate the results of these programs nationally in a way that will improve the train-

ing of teachers, counselors, administrators, and other instructional personnel in technology education.

OVERSIGHT

No findings or recommendations concerning oversight of the programs amended in this bill have been received by the Committee from the Committee on Government Operations. The provisions of H.R. 3102 are based upon findings from the Committee's ongoing oversight of existing programs.

COST ESTIMATE

The Congressional Budget Office has estimated that there will be no costs to the Federal government in implementing this legislation. The Committee concurs in these estimates and adopts them in compliance with clause VII of Rule 13. No cost estimates have been received from any other Federal department or agency.

The CBO letter follows:

U.S. CONGRESS,
CONGRESSIONAL BUDGET OFFICE,
Washington DC, August 11, 1986.

Hon. AUGUSTUS F. HAWKINS,
Chairman, Committee on Education and Labor,
U.S. House of Representatives, Washington, DC.

DEAR MR. CHAIRMAN: The Congressional Budget Office has reviewed H.R. 3102, as ordered reported by the House Committee on Education and Labor on July 31, 1986.

The purpose of H.R. 3102 is to develop a population knowledgeable about technology through the establishment of demonstration projects in technology education. The Department of Education would establish a grant program with local and state educational agencies, and other public and private agencies, organizations, and institutions for the purpose of developing such demonstration projects. The bill earmarks $2 million in fiscal years 1987, 1988, and 1989 from the Secretary's Discretionary Funds under section 583 of the Education Consolidation and Improvement Act of 1981 (ECIA).

Chapter 2 of the ECIA authorizes a set-aside of up to 6 percent of the appropriated funds for the Secretary's Discretionary Funds. These funds are used for activities that complement State and local efforts to improve the quality of elementary and secondary education. The authorizing statute mandates that, from the funds reserved, the Secretary must first fund the Inexpensive Book Distribution, Arts in Education, Alcohol and Drug Abuse Education, and Law-Related Education programs. Authorizations under the ECIA expire at the end of fiscal year 1987.

Passage of this bill could affect the budgets of state and local governments. Federal assistance to any project is limited to 65 percent of the cost of the program in any fiscal year. The bill requires a 10 percent minimum contribution from the private sector for each project. State and local governments could therefore be responsible for as much as $770,000 in each of the three fiscal years.

If you have any questions please contact me or have one of your staff call Ken Pott or Lynne Davidson (226–2820).

With best wishes,

Sincerely,

RUDOLPH G. PENNER, *Director.*

INFLATIONARY IMPACT

Since the bill involves no additional Federal cost, the Committee estimates it will have no inflationary impact.

SECTION-BY-SECTION ANALYSIS

Section 1. The short title of the bill in the Technology Education Act of 1986.

Sec. 2. The purpose of the Act is to assist educational agencies and institutions in developing a technologically literate population through instructional programs in technology education.

Sec. 3. Contains a definition of technology education. Defines other common educational terms as they are defined in existing educations laws.

Sec. 4. The Secretary of Education shall establish a program of grants to local educational agencies, State educational agencies, institutions of higher education, and consortia of public and private agencies, organizations and institutions, for demonstration programs in technology education.

This section also sets forth the allowable uses of funds under this program and the matching requirements.

Sec. 5. From the Secretary's discretionary fund, $2 million is reserved for each of the fiscal years 1987, 1988, and 1989 for technology education programs.

Sec. 6. The effective date of this Act is October 1, 1986.

CHANGES IN EXISTING LAW MADE BY THE BILL, AS REPORTED

In compliance with clause 3 of rule XIII of the Rules of the House of Representatives, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new matter is printed in italics, existing law in which no change is proposed is shown in roman):

SECTION 583 OF THE EDUCATION CONSOLIDATION AND IMPROVEMENT ACT OF 1981

DISCRETIONARY PROGRAM AUTHORIZED

SEC. 583. (a) * * *

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(c) For each of the fiscal years 1987, 1988, and 1989, from the funds reserved for the purposes of this section, subject to the provisions of subsection (b), the Secretary shall make available $2,000,000 to carry out the Technology Education Act of 1986.

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